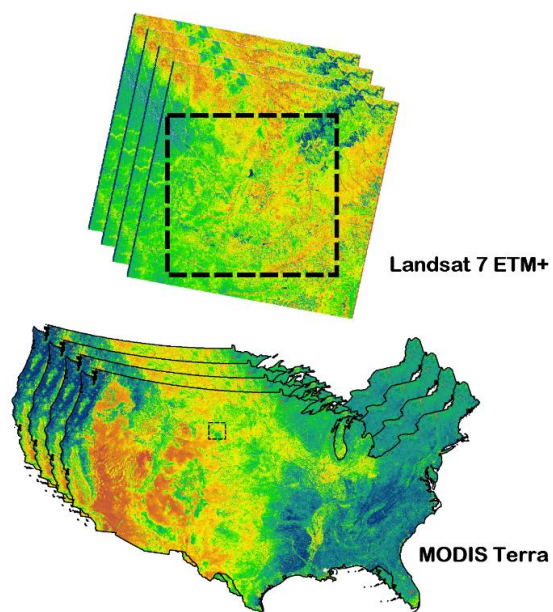
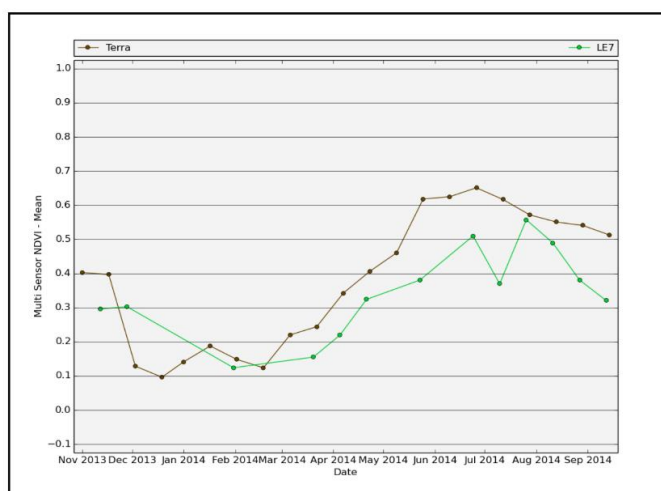


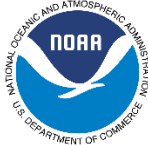
## USER GUIDE

### LAND PRODUCT CHARACTERIZATION SYSTEM (LPCS)



Version 2.1

July 2016



## Executive Summary

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This document describes the processes involved in generating per-scene and overlapping scene statistics for the Land Product Characterization System (LPCS), developed in collaboration between the U.S. Geological Survey (USGS) and the National Oceanic and Atmospheric Administration (NOAA).

Please note that this document describes statistics generated from subsets of brightness values (BVs) extracted from Landsat 4, 5, 7, and 8 scenes, as well as select\* Moderate Resolution Imaging Spectroradiometer (MODIS) MOD/MYD09 and MOD/MYD13 scenes. Instructions for ordering these products are found in the [ESPA On Demand Interface User Guide](#).

\* Select data products include MODIS Aqua (MYD) and Terra (MOD) 09A1, 09GA, 09GQ, 09Q1, 13Q1, 13A1, 13A2, and 13A3. More information about MODIS products is found at [https://lpdaac.usgs.gov/dataset\\_discovery/modis/modis\\_products\\_table](https://lpdaac.usgs.gov/dataset_discovery/modis/modis_products_table).

## Document History

Document Version	Publication Date	Change Description
Version 1.0	09/16/2014	Initial Draft
Version 1.1	10/14/2014	Addition of “valid” flag in per-band CSV file.
Version 1.2	11/01/2014	Updated cover figure.
Version 1.3	12/23/2014	Added descriptions for Landsat 8 OLI/TIRS products. Updated cover figure. Added additional acronym descriptions.
Version 1.4	01/09/2015	Edits for typographical and figure reference errors.
Version 1.5	03/06/2015	Added section for user interface steps for LPCS interface. Added product limitations to “Caveats and Constraints” section. Updated product guide formatting.
Version 1.6	05/27/2015	Removed Landsat 8 TIRS processing caveat.
Version 1.7	9/29/2015	Corrected URL for MODIS data products and Spectral Indices
Version 1.8	12/01/2015	Corrected small typos. Added simulated GOES-R ABI, NOAA VIIRS, and NASA VIIRS datasets (none available for statistics generation at this time).
Version 1.9	12/16/2015	Added caveat for maximum pixel count per grid. Updated tables to indicate cloud mask (CFmask) ordering option for Landsat products. Updated “stats” output formatting changes (now CSV instead of text file).
Version 2.0	05/10/2016	Switched nomenclature from “Product Guide” to “User Guide” to better reflect guide’s purpose. Added additional caveats and constraints related to Landsat Surface Reflectance and usability of sample products (GOES-R ABI, VIIRS) in LPCS. Changed references from “CDR” to “Surface Reflectance” (more specific).
Version 2.1	07/01/2016	Updated name and links to Landsat 8 Surface Reflectance Code (LaSRC) product and product guide.

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## Section 1 Introduction

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The long-term acquisition and subsequent archiving of remotely sensed imagery continuously provides an ever-growing record for land surface change. The Land Product Characterization System (LPCS) allows for the generation of statistics from one or more pixels from spatially overlapping Landsat Thematic Mapper (TM), Enhanced Thematic Mapper Plus (ETM+), Operational Land Imager/Thermal Infrared Sensor (OLI/TIRS), and select Moderate Resolution Imaging Spectroradiometer (MODIS) Terra and Aqua Surface Reflectance (MOD/MYD09) and Vegetation Indices (MOD/MYD13). The minimum, maximum, mean, and standard deviation are calculated from within a user-defined bounding box. Statistical results are provided in two different directories:

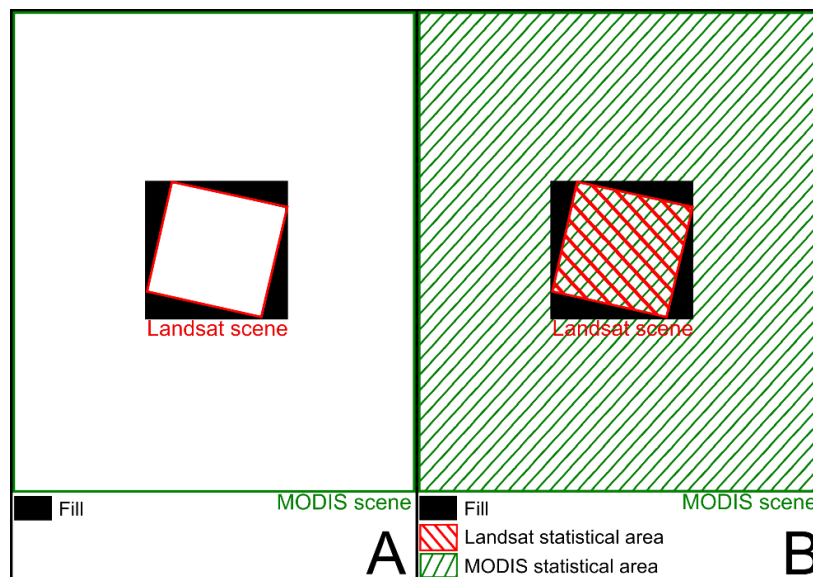
- 1) As a “stats” folder within each unique scene identifier’s (sceneID) .tar.gz archive, containing text files for each band.
- 2) As a separate .tar.gz archive, named with the “-statistics” suffix. Within the archive, two file types exist:
  - a. Plots of individual bands and plots of each band across different sensors (if applicable).
  - b. Comma-Separated Value (.csv) files corresponding to each plot.

Each output type is explained in detail in **Section 5 Output Formats**.

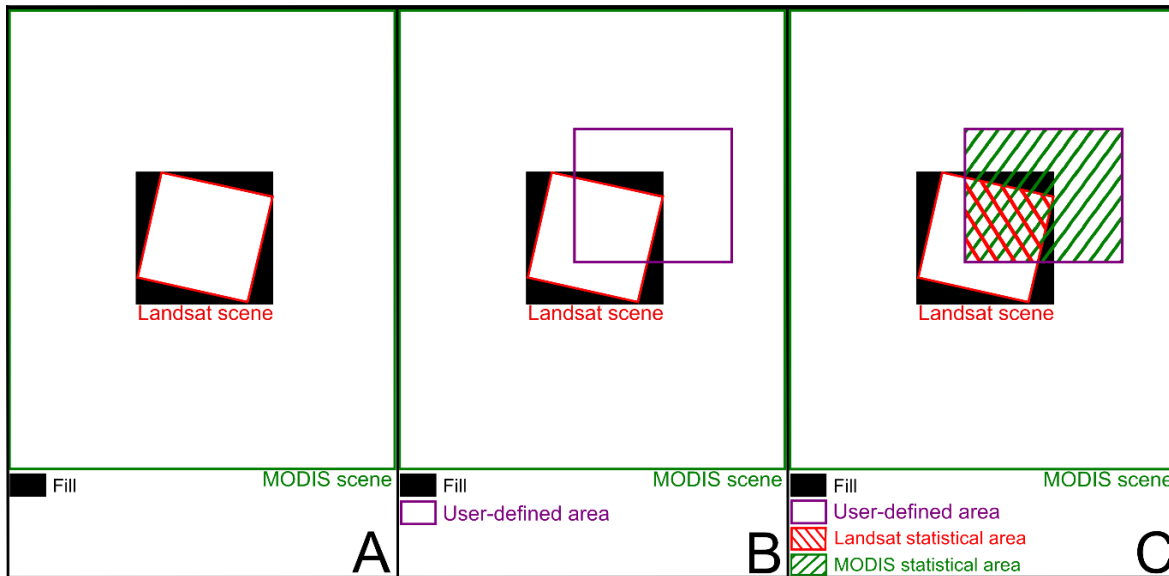
## Section 2 Caveats and Constraints

---

- 1) Only Landsat 4-8, MODIS MOD/MYD09 and MOD/MYD13 data products can be processed and have statistics generated through the ESPA system.
- 2) The sample datasets available through LPCS – Simulated GOES-R ABI NDVI, NASA VIIRS NDVI, and NOAA VIIRS NDVI can be downloaded, but cannot be processed and/or have statistics generated via ESPA at this time.
- 3) Statistical analysis is performed only on areas occurring within the user-defined mask. Examples of how statistical areas are selected are shown in **Figure 2-1** and **Figure 2-2**.



**Figure 2-1 A) Base image comparison of a Landsat scene (red) within a Moderate Resolution Imaging Spectroradiometer (MODIS) scene (green). B) Statistical areas generated through Land Product Characterization System (LPCS) include overlap between the Landsat scene (red stripes) and the MODIS scene (green stripes).**



**Figure 2-2 A) Base image comparison of a Landsat scene (red) within a Moderate Resolution Imaging Spectroradiometer (MODIS) scene (green). B) User-defined area for statistical analysis added (purple). C) Statistical areas generated within user-defined boundary (purple) for the Landsat scene (red stripes) and the MODIS scene (green stripes).**

- 4) Alignment of statistical zones between MODIS (natively Sinusoidal) and Landsat (natively Universal Transverse Mercator (UTM)) requires that both products be projected to a common grid.
- 5) There are no constraints on generating statistics based upon ESPA's customization options. All output formats, projections, image extents, and pixel resizing are compatible with statistical generation.
- 6) Due to system limitations, image extents in ESPA cannot exceed 200 million pixels per band.
- 7) Specific pixel types will not be included in the statistical calculation:
  - a) Areas masked as NoData (e.g., scene edges, Scan Line Corrector (SLC)-off data gaps).
  - b) Areas of the scene not included within the study area mask (i.e., user-defined area), if specified.
  - c) Pixels beyond the valid range of data. Valid ranges are described in **Table 2-1**.
- 8) The Landsat 4-7 Surface Reflectance algorithm (LEDAPS) is different from the Landsat 8 Surface Reflectance Code (LaSRC) algorithm. Additional caveats and constraints for each dataset are described in the [Landsat 4-7 SR Product Guide](#) and the [Provisional Landsat 8 Surface Reflectance Code \(LaSRC\) Product Guide](#).

**Table 2-1 Valid ranges by date type.**

*SR Surface Reflectance, TOA Top of Atmosphere, SI Spectral Indices, BT Brightness Temperature*

Data Product	Valid Range	Scale Factor	Plot Display Range
Surface Reflectance (SR)	0 – 10000	0.0001	0.0 – 1.0
Top of Atmosphere Reflectance (TOA)	0 – 10000	0.0001	0.0 – 1.0
Spectral Indices (SIs)	-10000 – 10000	0.0001	0.0 – 1.0
Brightness Temperature (BT)	0 – 10000	0.1	0.0 – 1.0
Emissivity	1 – 255	1.0	0.0 – 1.0

More information about the Landsat data products and their valid ranges can be found in the [Landsat 4-7 Surface Reflectance Product Guide](#), the [Provisional Landsat 8 Surface Reflectance Code \(LaSRC\) Product Guide](#), and the [Surface Reflectance-Derived Spectral Indices \(SI\) Product Guide](#). MODIS data product information can be found in the [LP DAAC MODIS Data Products Table](#).

## Section 3 Product Options

---

Through the [ESPA On Demand Interface](#), statistics can be generated by selecting the “Plot Output Product Statistics” button under the “Intercomparison & Statistics” category. More information about the product ordering procedure is in **Section 4 LPCS Interface**.

The full list of available products is shown in **Table 3-1**. The possible output ranges, or valid ranges, are described in **Table 2-1**. The user-defined bounding box extent determines the area of statistical analysis. Data within the bounding box will have statistics calculated; if no bounding box is specified, statistics will be calculated for the entire scene, regardless of overlap. Please refer to **Section 2 Caveats and Constraints** regarding extent parameters.

**Table 3-1 Available products for statistics generation.**

*SR Surface Reflectance, TOA Top of Atmosphere, BT Brightness Temperature, NDVI Normalized Difference Vegetation Index, NDMI Normalized Difference Moisture Index, NBR Normalized Burn Ratio, NBR2 Normalized Burn Ratio 2, SAVI Soil Adjusted Vegetation Index, MSAVI Modified Soil Adjusted Vegetation Index, EVI Enhanced Vegetation Index, TM Thematic Mapper, ETM+ Enhanced Thematic Mapper Plus, OLI Operational Land Imager, TIRS Thermal Infrared Sensor, MOD MODIS Terra, MYD MODIS Aqua, 09A1 Surface Reflectance 8-Day L3 Global 500m, 09GA Surface Reflectance Daily L2G Global 1 km and 500m, 09GQ Surface Reflectance Daily L2G Global 250m, 09Q1 Surface Reflectance 8-Day L3 Global 250m, 13Q1 Vegetation Indices 16-Day L3 Global 250m, 13A1 Vegetation Indices 16-Day L3 Global 500m, 13A2 Vegetation Indices 16-Day L3 Global 1km, 13A3 Vegetation Indices Monthly L3 Global 1km*



Product	Landsat 4/5 TM	Landsat 7 ETM+	Landsat 8 OLI/TIRS	MODIS Terra (MOD) and Aqua (MYD)							
				09A1	09GA	09GQ	09Q1	13Q1	13A1	13A2	13A3
Surface Reflectance (SR)	X	X	X	X*	X**	X**	X**				
Top of Atmosphere (TOA)	X	X	X								
Brightness Temperature (BT)	X	X	X								
CFmask	X	X	X								
NDVI	X	X	X					X	X	X	X
NDMI	X	X	X								
NBR	X	X	X								
NBR2	X	X	X								
SAVI	X	X	X								
MSAVI	X	X	X								
EVI	X	X	X					X	X	X	X

\* MODIS surface reflectance bands 1 through 7.

\*\* MODIS surface reflectance bands 1 and 2.

## Section 4 LPCS Interface

---

The LPCS interface (<http://lpcsexplorer.cr.usgs.gov/>) allows users to query and generate Landsat and MODIS sceneIDs for statistical characterization. The LPCS interface is based upon the USGS EarthExplorer interface: <http://earthexplorer.usgs.gov/>.

An expanded explanation of the advanced EarthExplorer search features are found at: [https://lta.cr.usgs.gov/ee\\_tutorial\\_search\\_criteria](https://lta.cr.usgs.gov/ee_tutorial_search_criteria).

Below is an example of how to place a simple order through the LPCS interface.

LPCS



USGS

science for a changing world

Land Product Characterization System

USGS Home

Contact USGS

Search USGS

Land Product Characterization System (LPCS)

Page Expires In 1:59:03

Home

2 New System Messages

Login

Register

RSS

Feedback

Help

Search Criteria

Data Sets

Additional Criteria

Results

1. Enter Search Criteria

To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

Address/Place

Path/Row

Feature

Circle

Show

Clear

Coordinates

Predefined Area

Shapefile

KML

Degree/Minute/Second

Decimal

No coordinates selected.

Use Map

Add Coordinate

Clear Coordinates

Date Range

Result Options

Search from:

01/01/1920

to:

02/04/2015

Search months:

(all)

Data Sets »

Additional Criteria »

Results »

Search Criteria Summary (Show)

Clear Criteria

(70° 01' 14" N, 157° 08' 54" W)

Options

Overlays

Map

Satellite



Google

Map data ©2015 Google, INEGI Imagery ©2015 NASA, TerraMetrics

1000 km

Terms of Use

The up-to-date Google map is not for purchase or for download; it is to be used as a guide for reference and search purposes only.

Accessibility

FOIA

Privacy

Policies and Notices

Google Maps API Disclaimer

U.S. Department of the Interior U.S. Geological Survey

URL: <http://lpcsexplorer.cr.usgs.gov>

Page Contact Information: [ita@usgs.gov](mailto:ita@usgs.gov)

Page Last Modified: 11/03/2014

Server: edclx159

USA.gov

TAKE PRIDE IN AMERICA

**Figure 4-1 LPCS interface (<http://lpcsexplorer.cr.usgs.gov/>) home page. Select “Login” from the top-right corner, and use USGS Registration credentials to login.**

Search Criteria

Data Sets

Additional Criteria

Results

## 1. Enter Search Criteria

To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

Address/Place

Path/Row

Feature

Circle

Point

Polygon

Type: WRS2 ▼ Path: 27 Row: 33

Show

Clear

Coordinates

Predefined Area

Shapefile

KML

Degree/Minute/Second

Decimal

*No coordinates selected.*

Use Map

Add Coordinate

Clear Coordinates

Date Range

Result Options

Search from: 01/01/1920 to: 02/04/2015

Search months: (all) ▼

Data Sets »

Additional Criteria »

Results »

**Figure 4-2 LPCS interface (<http://lpcsexplorer.cr.usgs.gov/>) Search Criteria tab. Regions of interest can be selected by address or place, WRS Path/Row, feature, circle, coordinates, or a predefined area. The date(s) of interest can be filtered from beginning (“from”) to the end (“to”).**



Search Criteria
Data Sets
Additional Criteria
Results

### 3. Additional Criteria (Optional)

If you have more than one data set selected, use the dropdown to select the additional criteria for each data sets.

Data Sets:  
Land Surface Reflectance - L8 OLI/TIRS ▼

**WRS Path**  
 to

**WRS Row**  
 to

**Sensor ID**  
All  
OLI  
OLI\_TIRS ▼

**Data Type Level 1**  
All  
Level 1GT  
Level 1T ▼

**Data Type L0RP**  
All  
Level 0Rp ▼

**Cloud Cover**  
All  
Less than 10%  
Less than 20%  
Less than 30%  
Less than 40% ▼

Reset All Criteria
Results »

**Figure 4-4 LPCS interface (<http://lpcsexplorer.cr.usgs.gov/>) Additional Criteria tab. Landsat products can be filtered by the following criteria: individual Landsat Scene Identifier (sceneID), WRS Path range, WRS Row range, Sensor ID, Data Type Level 1, Data Type L0RP, Cloud Cover, and Day/Night scenes. MODIS products can be filtered by the following criteria (not shown): Entity ID, Horizontal Tile range, Vertical Tile range, and Day/Night scenes.**



Search Criteria

Data Sets

Additional Criteria

Results

#### 4. Search Results

If you selected more than one data set to search, use the dropdown to see the search results for each specific data set.

Show Result Controls

Data Set


Click here to export your results »

Land Surface Reflectance - L8 OLI/TIRS

« First » Previous 1 ▼ Next » Last »

Displaying 1 - 10 of 39

1




Entity ID: LC80270332014342LGN00


Coordinates: 38.90435,-95.40504


Acquisition Date: 08-DEC-14

Path: 27


Row: 33








2






Entity ID: LC80270332014326LGN00



Coordinates: 38.90431,-95.4063

Acquisition Date: 22-NOV-14


Path: 27

Row: 33

3









Entity ID: LC80270332014310LGN00

Coordinates: 38.90413,-95.41562


Acquisition Date: 06-NOV-14

Path: 27

Row: 33

4




Entity ID: LC80270332014294LGN00

Coordinates: 38.90433,-95.41533



Acquisition Date: 21-OCT-14

Path: 27

Row: 33





**Figure 4-5 LPCS interface (<http://lpcsexplorer.cr.usgs.gov/>) Results tab. Products can be added to the Item Basket by clicking on the Cart icon.**

Land Product Characterization System

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Version 2.1

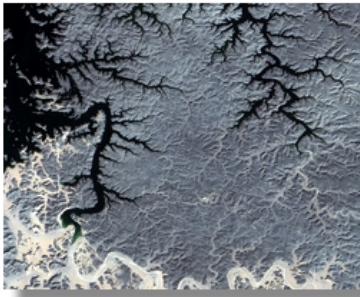
**To complete your order follow these steps**

1. Click the "Download Scene List" button below and save the file to your computer
2. Go to [espa.cr.usgs.gov](http://espa.cr.usgs.gov)
3. Upload your scene list to the ESPA site and complete your order

Clear Item Basket

Download Scene List

**Figure 4-6 LPCS interface (<http://lpcsexplorer.cr.usgs.gov>) Item Basket. The “Download Scene List” option downloads a text file of sceneIDs for both Landsat and MODIS products.**



**Did you know?**

All LSRD software is freely available and licensed under the NASA Open Source Agreement.

[Go there now](#)

**Current Offerings**

Bulk Ordering	Bulk Ordering API	LPCS
<p>Bulk ordering allows a list of Landsat scenes to be submitted for additional processing beyond what is available through the standard Landsat Level 1 processing.</p> <p>This is the primary mechanism to gain access to LSRD's provisional and prototype data products.</p>	<p>The API will enable end-users to write their own clients to interact with all Bulk Ordering capabilities.</p> <p>The Bulk Ordering API will be implemented as a REST service using HTTP and JSON and will therefore be available from most programming languages.</p>	<p>Land Product Characterization provides a way to perform statistical comparisons between datasets obtained from disparate sensors.</p> <p>LPCS currently supports MODIS and Landsat surface reflectance products only, but further development will expand the offerings.</p>
<a href="#">Order Data</a>	Coming Soon!	<a href="#">Generate Comparisons</a>

**Figure 4-7 Earth Resources Observation and Science (EROS) Center Science Processing Architecture (ESPA) Interface (<http://espa.cr.usgs.gov>) LPCS Generate Comparisons option. USGS Registration credentials are required to access the ESPA interface. By selecting “Generate Comparisons”, the text file generated by the LPCS interface can be uploaded and comparison statistics can be generated.**



**Figure 4-8 Earth Resources Observation and Science (EROS) Center Science Processing Architecture (ESPA) Interface (<http://espa.cr.usgs.gov/>) Intercomparison & Statistics option. This option must be selected for statistics files to be generated from ESPA. Detailed information on other ESPA products and processing options are found at: [http://landsat.usgs.gov/documents/espa\\_odl\\_userguide.pdf](http://landsat.usgs.gov/documents/espa_odl_userguide.pdf).**

## Section 5 Output Formats

---

### 5.1 “Stats” Folder

For each scene, statistics are output to a folder named “stats” containing raw data (CSV files) and plots (PNG files). An example of the folder contents is shown in **Appendix A Landsat “Stats” Directory File Characteristics**. Each data type and its related statistic are separated by an equal sign (=) without spaces. All data in the output text files are represented as their true value and not the scaled range. Data are displayed as floating-point values with six digits of precision. For example, the .stats file for band 1 surface reflectance of Landsat scene LE70290322002235EDC00 is formatted as follows:

```
FILENAME=LE70290322002235EDC00_sr_band1.img
MINIMUM=48.000000
MAXIMUM=3854.000000
MEAN=792.061438
STDDEV=377.987883
VALID=yes
```

### 5.2 Statistics Archive File

On the ESPA order status page, the statistics archive is downloadable under the ID named “Plotting and Statistics.” Each .tar.gz archive is named with the order ID as the prefix and “-statistics” as the suffix. Each statistic is separated by band but grouped together by sensor platform type. The groups of sensors are plotted by band and output as a separate statistics CSV file (

**Table 5-1**). In cases where a band may not have any values within the valid range, such as pixel saturation, the statistics will be reported as “-9999” and the VALID cell will be flagged with “no”. Each CSV file is written by row and contains a header in the first row. All bands are plotted together with the prefix “multi\_sensor\_” and are plotted against one another. An example of the archive contents is shown in **Appendix B Statistics Archive File Characteristics**.



**Table 5-1 Example of statistics CSV file generated by Land Product Characterization System (LPCS) for an example Landsat 7 Enhanced Thematic Mapper Plus (ETM+) shortwave infrared (SWIR) band.**

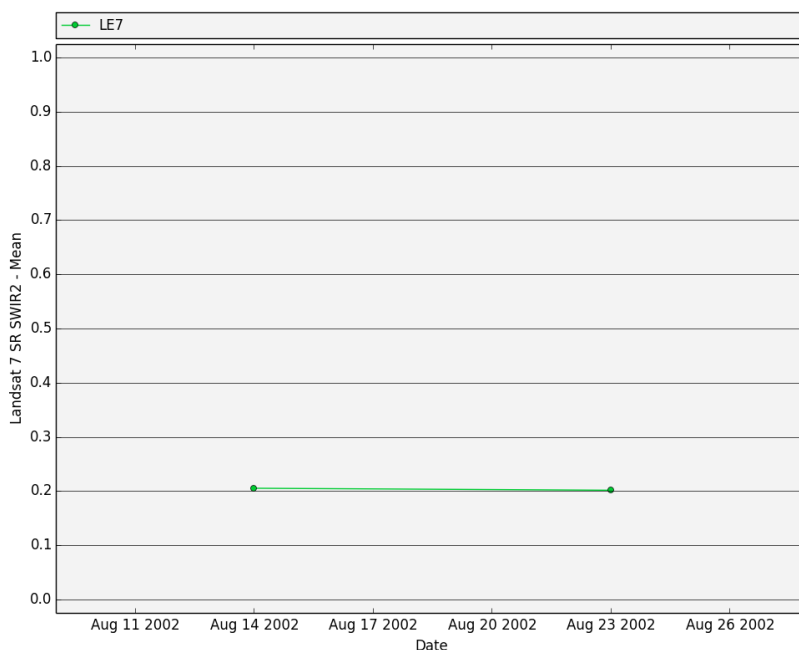
*STDDEV Standard deviation*

DATE	DOY	MINIMUM	MAXIMUM	MEAN	STDDEV	VALID
8/14/2002	226	20	5617	2051.171233	922.578122	yes
8/23/2002	235	6	6176	2014.419846	876.984359	yes

## 5.4 Plots

Plots are displayed with the date on the X axis (in date format MMM DD YYYY) and individual bands scaled as 0.0 to 1.0 on the Y axis. Plots can represent the following statistics: minimum, maximum, mean, standard deviation, or a combination of minimum-maximum-mean. All data points are represented with a color-coded point, where the color represents a specific sensor platform (**Figure 5-1**). In the minimum-maximum-mean plot, the point represents the mean, the vertical line above the point represents the maximum value, and the vertical line below the point represents the minimum value (**Figure 5-2**). Multiple sensors across similar time scales are represented by different colors of lines and points, shown in **Figure 5-3**. Multi-sensor plots use the same statistics as the individual sensor plots discussed above.

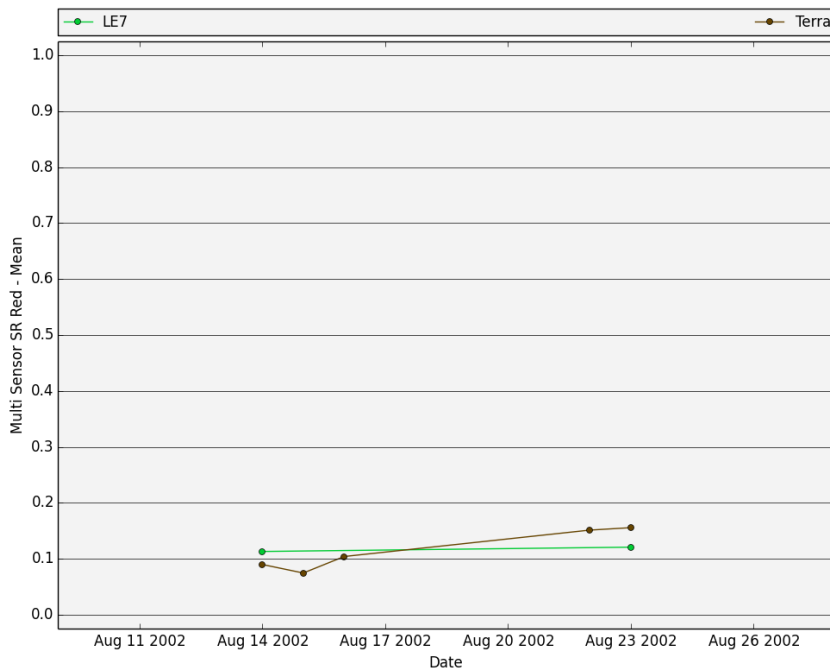
Note that plots are only generated for orders containing two or more scenes for each sensor. For example, an order of two Landsat ETM+ scenes and one MODIS MYD09 scene would generate plots for “landsat” and “multi\_sensor,” but not for “modis.”



**Figure 5-1 Example of mean plot generated by Land Product Characterization System (LPCS) for a single Landsat 7 Enhanced Thematic Mapper Plus (ETM+) shortwave infrared (SWIR) band.**



**Figure 5-2 Example of minimum-maximum-mean plot generated by Land Product Characterization System (LPCS) for a single Landsat 7 Enhanced Thematic Mapper Plus (ETM+) shortwave infrared (SWIR) band.**



**Figure 5-3 Example of multi-sensor mean plot generated by Land Product Characterization System (LPCS) for single Landsat 7 Enhanced Thematic Mapper Plus (ETM+) and MODIS Terra (MOD) bands.**

## Section 6 User Services

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LPCS and associated interfaces are supported by User Services staff at the USGS EROS Center. Any questions, comments, or interface problems are welcomed through the Landsat “Contact Us” online correspondence form. An email can also be sent to the customer service address included below, with the same indication of topic.

USGS User Services

<http://landsat.usgs.gov/contactus.php>  
[custserv@usgs.gov](mailto:custserv@usgs.gov)

User support is available Monday through Friday from 8:00 a.m. to 4:00 p.m. central time. Inquiries received outside of these hours will be addressed during the next business day.

## Section 7 Citation Information

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There are no restrictions on the use of these high-level Landsat products. It is not a requirement of data use, but please include the following citation in publication or presentation materials based on these products to acknowledge the USGS as a data source, and to credit the original research.

*Landsat High-Level products courtesy of the U.S. Geological Survey Earth Resources Observation and Science Center.*

There are no restrictions on the use of MODIS products. It is not a requirement of data use, but please use one of the citations in the link below in publication or presentation materials based on these products to acknowledge Land Processes Distributed Active Archive Center (LP DAAC) as a data source, and to credit the original research. More information on LP DAAC citation formats can be found at [https://lpdaac.usgs.gov/about/citing\\_lp\\_daac\\_and\\_data](https://lpdaac.usgs.gov/about/citing_lp_daac_and_data).

## Appendix A Landsat “Stats” Directory File Characteristics

*ETM+ Enhanced Thematic Mapper Plus, TM Thematic Mapper, OLI Operational Land Imager, TIRS Thermal Infrared Sensor, MODIS Moderate Imaging Spectroradiometer, SR Surface Reflectance, TOA Top of Atmosphere, Stats Statistics*

NOTE: A Landsat 7 ETM+ sceneID is used only as an example. Landsat 4 TM, Landsat 5 TM, Landsat 8 OLI/TIRS, and MODIS files have similar characteristics.

NOTE: Each file contains the following fields:

- FILENAME
- MINIMUM
- MAXIMUM
- MEAN
- STANDARD DEVIATION (STDDEV)
- VALID

Description	Example File Size (bytes)	Example File Name
SR Band 1 Statistics	4,096	LE70290322002235EDC00_sr_band1.stats
SR Band 2 Statistics	4,096	LE70290322002235EDC00_sr_band2.stats
SR Band 3 Statistics	4,096	LE70290322002235EDC00_sr_band3.stats
SR Band 4 Statistics	4,096	LE70290322002235EDC00_sr_band4.stats
SR Band 5 Statistics	4,096	LE70290322002235EDC00_sr_band5.stats
SR Band 7 Statistics	4,096	LE70290322002235EDC00_sr_band7.stats
TOA Band 6 Statistics	4,096	LE70290322002235EDC00_toa_band6.stats

## Appendix B Statistics Archive File Characteristics

*ETM+ Enhanced Thematic Mapper Plus, TM Thematic Mapper, OLI Operational Land Imager, TIRS Thermal Infrared Sensor, MODIS Moderate Imaging Spectroradiometer, SR Surface Reflectance, TOA Top of Atmosphere, Stats Statistics, CSV Comma-separated values, PNG portable network graphics, NIR near infrared, swir1 shortwave infrared band 1, swir2 shortwave infrared band 2, Stddev standard deviation, MOD09GQ MODIS Terra Surface Reflectance Daily L2G Global 250m*

NOTE: Two Landsat 7 ETM+ and three MODIS MOD09GQ scene IDs are used only as an example. Landsat 4 TM, Landsat 5 TM, Landsat 8 OLI/TIRS, and other MODIS files have similar characteristics.

Description (File count)	Example File Size (bytes)	Example File Name	Possible Bands
Landsat 7 ETM+ surface reflectance raw statistics (7)	28,672	landsat_7_sr_*_stats.csv	blue, green, red, nir, swir1, swir2, thermal
MODIS MOD09GQ surface reflectance raw statistics (2)	8,192	terra_sr_*_stats.csv	nir, red
Landsat 7 ETM+ surface reflectance statistical plots (25)	753,664	landsat_7_sr_*_plot.png	blue, green, red, nir, swir1, swir2, thermal; minimum, maximum, mean, stddev, minimum_maximum_mean
MODIS MOD09GQ surface reflectance statistical plots (8)	237,568	terra_sr_*_plot.png	Nir, red; minimum, maximum, mean, stddev, minimum_maximum_mean
Multi-sensor surface reflectance statistical plots (10)	372,736	multi_sensor_sr_*_plot.png	blue, green, red, nir, swir1, swir2, thermal; minimum, maximum, mean, stddev, minimum_maximum_mean

## Appendix C Acronyms

Acronym	Description
09A1	MODIS Surface Reflectance 8-Day L3 Global 500m
09GA	MODIS Surface Reflectance Daily L2G Global 1 km and 500m
09GQ	MODIS Surface Reflectance Daily L2G Global 250m
09Q1	MODIS Surface Reflectance 8-Day L3 Global 250m
13Q1	MODIS Vegetation Indices 16-Day L3 Global 250m
13A1	MODIS Vegetation Indices 16-Day L3 Global 500m
13A2	MODIS Vegetation Indices 16-Day L3 Global 1km
13A3	MODIS Vegetation Indices Monthly L3 Global 1km
ABI	Advanced Baseline Imager (aboard GOES-R satellite)
BT	Brightness Temperature
BV	Brightness Value
CDR	Climate Data Record
CFmask	C version of Function of Mask
CSV	Comma-Separated Values
ECV	Essential Climate Variable
EE	EarthExplorer
ENVI	Exelis Visual Information Solutions
EROS	Earth Resources Observation and Science
ESPA	EROS Science Processing Architecture
ETM+	Enhanced Thematic Mapper Plus
EVI	Enhanced Vegetation Index
GOES-R	Geostationary Operational Environmental Satellite R-Series
HDF-EOS2	Hierarchical Data Format – Earth Observing System (version 2)
LaSRC	Landsat 8 Surface Reflectance Code
LEDAPS	Landsat Ecosystem Disturbance Adaptive Processing System algorithm
LPCS	Landsat Product Characterization System
LP DAAC	Land Processes Distributed Active Archive Center
MOD	MODIS Terra
MODIS	Moderate Resolution Imaging Spectroradiometer
MSAVI	Modified Soil Adjusted Vegetation Index
MYD	MODIS Aqua
NASA	National Aeronautics and Space Administration
NBR	Normalized Burn Ratio
NBR2	Normalized Burn Ratio 2
NDMI	Normalized Difference Moisture Index
NDVI	Normalized Difference Vegetation Index
NIR	Near Infrared
NOAA	National Oceanic and Atmospheric Administration
OLI	Operational Land Imager
PNG	Portable Network Graphics
sceneID	Scene Identifier
SLC	Scan Line Corrector
SR	Surface Reflectance
Stats	Statistics
Stddev	Standard deviation
SWIR	Shortwave Infrared
TIRS	Thermal Infrared Sensor
TM	Thematic Mapper
TOA	Top of Atmosphere
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VIIRS	Visible Infrared Imaging Radiometer Suite